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Performance measurement for ambulatory care: moving towards a new agenda

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Abstract

Despite a shift in care delivery from inpatient to ambulatory care, performance measurement efforts for the different levels in ambulatory care settings such as individual physicians, individual clinics and physician organizations have not been widely instituted in the United States (U.S.). The Health Plan Employer Data and Information Set (HEDIS®), the most widely used performance measurement set in the U.S., includes a number of measures that evaluate preventive and chronic care provided in ambulatory care facilities. While HEDIS® has made important contributions to the tracking of ambulatory care quality, it is becoming increasingly apparent that the measurement set could be improved by providing quality of care information at the levels of greatest interest to consumers and purchasers of care, namely for individual physicians, clinics and physician organizations. This article focuses on the improvement opportunities for quality performance measurement systems in ambulatory care. Specific challenges to creating a sustainable performance measurement system at the level of physician organizations, such as defining the purpose of the system, the accountability logic, information and reporting needs and mechanisms for sustainable implementation, are discussed.

Keywords: ambulatory care, HEDIS, managed care, performance measurement, physician organizations

Increasingly, ambulatory care, that is, care not requiring overnight hospitalization, is becoming the predominant form of health care delivery in the United States (U.S.) [1]. The shift away from inpatient care has been made possible by the development of new medical and diagnostic procedures as well as other technological advances that allow for services to be delivered on an outpatient basis. Outpatient services are delivered in a variety of settings including freestanding medical offices or clinics, clinics attached to or within hospitals, and freestanding facilities that provide ambulatory, primary, specialty and surgical services.

Despite this shift in care delivery, quality assessment efforts for ambulatory care at the physician or physician organization level lag behind efforts that have been instituted in U.S. hospitals and nursing homes [2]. While licensure and regulatory programs monitor individual physicians and health plans, neither federal nor state regulators require ambulatory care facilities to meet specific standards of quality. Similarly, non-hospital based facilities providing outpatient care are typically not evaluated against the quality of care standards of accrediting organizations such as the National Committee on Quality Assurance (NCQA) or the Joint Commission on Accreditation of Health care Organizations (JCAHO) [2].

To date, the most widely used quality measurement system (the Health Plan Employer Data and Information Set or HEDIS®) aggregates performance information at the level of the health plan. In the U.S. many health plans contract for a defined set of services with physician practices known as independent practice associations or IPAs. The term 'IPA model' refers to this contract arrangement. To reflect the varying sizes and formats of different IPAs, plans contracting with large physician practices are known as 'group model IPAs', and those contracting with multi-specialty physician groups as 'network IPAs'. While less common, some health plans directly employ physicians who provide care only to the plan's patients (staff model health plan).

Currently only half of the individuals with employer-sponsored health insurance coverage have the choice of more than one health plan [3]. Therefore, consumers may find information on physicians or physician organizations to be more useful for selection purposes than information on health plans [4].

The need for health care quality information for decision-makers and policy experts as well as for consumers and patients was recently re-emphasized by the Institute of Medicine report 'Crossing the Quality Chasm'[5]. It is argued

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that, in order to ensure that critical goals and aims of the US-American health care system are met and patients can optimally participate in their care, information needs to be made available to them on the quality of health care organizations.

Current information available to consumers and purchasers about ambulatory care does not extend beyond basic information such as office hours, specialization of the practitioner (board certification), or gross violations of standards of care by practitioners (license sanctions) [6]. While this information may be useful, it does not necessarily provide meaningful information about the quality of ambulatory care [7]. Such basic information is available through Internet web sites that may also provide physician-level consumer satisfaction information collected through on-line surveys. However, these surveys typically do not provide statistically valid information on comparative performance because of the non-systematic sampling strategies (e.g. convenience sampling) they employ and other methodological concerns.

While health plans routinely collect information (e.g. utilization profiles) about ambulatory care quality for the sites included in their network of care delivery, this information is generated for internal business purposes only and is not typically available to enrollees, consumers or purchasers of health care [8]. A few health plans collect quality of care information about their network of providers or provider groups [9] with the intent of making this information available to their enrollees and the general public [10]. However, because this information is collected using small sample sizes and is therefore liable to bias, the information is typically only valid or reliable at the aggregation level of large group practices.

The benefits of public disclosure of performance indicators have been discussed in the literature with some evidence available outlining its positive effect on ambulatory and health care quality [11]. Several action mechanisms have been proposed by which public disclosure of performance information is thought to impact health care quality. Examples of such mechanisms include fostering of consumer and purchaser choice based on objective performance information as well as reinforcement and encouragement of quality improvement efforts at the provider level that, aided by performance feedback, may stimulate a desire to outperform competitors. While empirical information about the impact of public disclosure of performance information may be limited, it has been argued that making data on health care quality publicly available may simply be 'the right thing to do' in a consumer society such as the U.S., where demand, supply, quality and cost are meant to 'self-regulate' the marketplace. In this context it is reasoned that the health care marketplace cannot perform effectively if meaningful information about both the cost and quality of products is not made available. The importance of publicly available quality information might also be of heightened importance in advanced managed care markets where health care organizations' ability to compete on price alone has become curtailed. In these markets competition on health care value (quality/cost) might be more effective for differentiation in the marketplace [12].

This article introduces the most widely used performance measurement and reporting system (HEDIS®) for ambulatory care quality. In addition, we broadly outline some critical challenges that must be overcome before sustainable performance measurement efforts can be instituted at the level of physician organizations, clinics or even individual physicians.

Current performance measurement system for ambulatory care in the U.S. – HEDIS

HEDIS® is the most widely used health care performance measurement set in the U.S. Maintained by the NCQA, HEDIS® provides standardized information on the quality of care delivered by managed care organizations (MCOs) and includes more than 50 performance measures in areas such as effectiveness of care, access and availability of care, utilization of services and satisfaction with the experience of care. The majority of HEDIS® effectiveness of care measures evaluate care provided in ambulatory settings, creating a rich data set on the quality of both preventive and chronic care delivery.

Table 1 lists the current HEDIS® measures that apply to care and services delivered in ambulatory care settings. Each of these measures has met stringent criteria to become part of the measurement set. Three major measure attributes (feasibility, scientific soundness and relevance) are carefully evaluated and documented for each indicator. Table 2 lists a few of the specific components of these attributes that should be met by each HEDIS® measure.

HEDIS® performance indicators provide insight into the quality of care and services rendered by health plans. When examining HEDIS® data reported between 1996 and 2000, it is evident that some HEDIS® indicators document annual improvements for critical care issues while the findings on quality of other measures have appeared to 'plateau' or level off. For example, national HEDIS® averages for breast cancer screening rates increased only slightly from 72.2% in 1998 to 73.4% in 1999. In contrast, the 1999 national average for cholesterol screening for patients who experienced acute cardiovascular events rose to 68.9% from a 1998 average of 59.1% [13]. Static performance of a measure could be the result of a number of factors including demographics, the degree of health plan influence on physician actions and the level of quality improvement efforts expended. Measures with static performance are still considered valuable as long as there is sufficient documented variation in performance among plans (i.e. some plans still perform poorly while others perform well, indicating there is still room for improvement).

While HEDIS® measures are focused on screening and treatment activities occurring at the individual physician level (e.g. HbA1c tests for patients with diabetes, immunizations), their purpose is to report the findings on quality aggregated at the health plan level in an effort to facilitate value-based

Table 1 HEDIS® performance indicators on ambulatory care quality

Domain	Quality indicator
Effectiveness of Care	Childhood immunization status
	Adolescent immunization status
	Breast cancer screening
	Cervical cancer screening
	Chlamydia screening in women
	Controlling high blood pressure
	Cholesterol management after acute cardiovascular events
	Comprehensive diabetes care
	Follow-up after hospitalization for mental illness
	Antidepressant medication management
	Advising smokers to quit
	Flu shots for older adults
	Pneumonia vaccination for older adults
	Medicare health outcomes survey
	Use of appropriate medications for people with asthma
Access and availability	Adults' access to preventive/ ambulatory services
	Children's access to primary care physicians
	Prenatal and postpartum care
	Annual dental visit
Satisfaction with care	HEDIS®/CAHPS® adult and child surveys
Informed health care choices	Management of menopause
Use of services	Frequency of ongoing prenatal care
	Well-child visits in first 15 months
	Well-child visits in 3rd, 4th, 5th and 6th years
	Adolescent well-care visits
	Mental health utilization – inpatient, day/night care and ambulatory services
	Chemical dependency utilization

CAHPS®, Consumer Assessment of Health Plans Survey; HEDIS®, Health Plan Employer Data and Information Set.

Table 2 Selected desirable measure attributes for HEDIS® performance indicators

Attribute	Does the HEDIS® measure ...
Relevance	Evaluate a concept that is meaningful to at least once audience (e.g. consumers, purchasers, or health care systems)?
	Apply to conditions with high prevalence and seriousness?
	Encourage cost-effective activities?
	Evaluate processes or outcomes with a wide variation across systems for which there is substantial room for improvement?
Scientific soundness	Evaluate processes and outcomes that are linked by clinical evidence?
	Produce the same result when repeated in same population or setting?
	Produce accurate, reproducible and valid results when collected by different systems using different data sources?
Feasibility	Impose an inappropriate burden on health care systems?
	Violate standards of member confidentiality?
	Require only data that are easily available to the health care system?
	Invite manipulation or 'gaming' that is undetectable through an audit process?

purchasing. Value-based purchasing is intended to enable public and private purchasers to contract with health care vendors taking into account multiple criteria including cost, access and care. HEDIS® is designed to allow consumers and purchasers to make comparisons of quality of care between MCOs. Furthermore HEDIS® performance measures are intended to stimulate quality improvement activities within MCOs through performance feedback and public dissemination of information. HEDIS® information is currently disseminated through several mechanisms including NCQAs internet-based Health Plan Report Card [14], state and employer-specific report cards and the NCQAs Quality Compass® database.

While HEDIS® has made important contributions to the tracking of ambulatory care quality in the U.S., it is becoming increasingly apparent that the measurement set could be further improved by providing information at the levels of greatest interest for consumers, purchasers and other stakeholders. Stakeholders are increasingly interested in quality of care information that is closer to the locus of care delivery such as individual physicians, clinics and physician organizations [14]. It appears that performance measurement at the level of physician organizations (i.e. group practices) may initially be more feasible than measurement at the individual physician level where barriers such as small numbers of patients with specific clinical conditions could prove to be a challenge in calculating statistically meaningful performance rates. However, before a performance measurement framework for physician organizations can be established, a number of conceptual and methodological challenges must

be resolved. The following sections outline a few of these challenges and offer solutions to address them effectively.

Establishing a performance measurement framework for physician organizations

While advances have been made in ambulatory care performance measurement over the last decade, several major issues must be resolved before a credible, effective and efficient performance measurement system at the level of the physician organization can be implemented. These challenges include i) defining the purpose(s) of the measurement system; ii) determining an 'accountability logic'; iii) understanding stakeholder information and reporting needs and iv) fostering sustainable implementation. Potential solutions and action steps are proposed here to address these challenges.

Purpose(s) of the system

First, the purpose(s) of the system and the 'theory of action' by which implementation of the system will lead to the desired impact must be made explicit. It has been argued that measurement systems used for distinct purposes (e.g. accountability or quality improvement) differ substantially in their requirements [15] and are often applied and implemented in different ways within and between health care organizations [16]. Nevertheless, a performance measurement system might be able to serve multiple purposes effectively under certain conditions. For example, one purpose of the system could be to establish increased accountability of provider organizations in addition to providing patients, consumers and purchasers of care with more transparency for the care and outcomes produced in these settings and to facilitate consumer choice between providers or provider organizations. A second purpose of the system could be to provide actionable information to provider organizations that is helpful in aiding organizations' decision-making with respect to quality improvement. To be useful for quality improvement purposes performance feedback must be made available to organizations at frequent intervals, reflect events that occurred in the immediate past, be time-trended and be anchored to relevant benchmarks. It appears that performance measurement systems for ambulatory care are most likely to be implemented if these purposes could be met simultaneously.

Accountability

There is widespread agreement that MCOs are accountable for the care received by members enrolled on a prepaid basis in their organization [17]. There is, however, no general agreement on the care, services or outcomes for which physician organizations or individual physicians should ultimately be held accountable, particularly if care of a patient is coordinated between multiple providers (i.e. primary care provider, sub-specialist, etc.). In addition, the attribution of (accountability for) results of care or even clinical processes might be problematic in instances where patients do not select one physician from whom to receive care.

The appropriate assignment of accountability in the context of performance measurement for a physician organization may depend among other factors on the risk and delegation arrangements with MCOs. For example, it may be relatively easy to establish an accountability logic for those physician organizations that assume full financial risk and/or delegated care functions from MCOs with whom they contract. Because the physician organizations in these scenarios are responsible for clearly definable populations, the accountability logic governing the collection and reporting of HEDIS® measures by MCOs would simply extend to those provider organizations.

It is essential to consider many other factors when establishing an appropriate accountability framework at various levels in ambulatory care such as those of individual physicians, physician offices and physician organizations. Such factors as the domains of accountability (i.e. competence, legal and ethical conduct, financial performance, adequacy of access, public health promotion and community benefit) and the procedures of accountability (i.e. evaluation of adherence to specific criteria and dissemination of information about the evaluation) could be considered [18]. A detailed discussion of such a framework is essential but beyond the scope of this manuscript.

Most physician organizations in the U.S. do not currently assume significant risk or delegated care functions from health plans and are unlikely to do so over the next several years [19]. What aspects of their performance are they accountable for that should therefore be measured? For these physician organizations it is significantly more difficult to establish the population for which any rate-based performance indicator would apply (i.e. the denominator). For example, to establish a mammography rate for a physician organization that has not accepted delegated managed care functions from health plans or whose physicians have not been required to be selected by patients as primary care providers, one would need to determine which patients should enter into the calculation. Should a woman who has visited the clinic or organization only once in the last 2 years be included in the denominator? How about a woman who has regularly visited the clinic (greater than two visits per year) for the last 7 years but has not had one visit in the last year? Is it known that she is now receiving her care elsewhere? Should this woman be considered as having switched her regular doctor? Is someone else now 'responsible' for her care?

These examples suggest that an intuitive, widely accepted solution for establishing appropriate denominators for rate-based measures at the physician organization level might not be easily available. However, it may be possible to establish an algorithm to identify patient samples that are appropriate for accountability measures for the physician organizations that assume little to no risk or delegation from third party payers. By initiating a series of pilot projects, various patient identification algorithms and validation procedures could be tested to establish estimates for the number of patients who are inappropriately identified for the denominator of a rate-based measure. These estimates could be obtained by establishing the number of individuals who change their doctor

or provider organization during the time intervals considered for sampling and measurement and who would have been otherwise included in the algorithm. This approach, however, has limitations. Even if research establishes these estimates, they can only serve as a guide for policy makers and stakeholders. Ultimately a political consensus will have to be established, informed by research, that allows for the operationalization of accountability and patient identification definitions for populations served by provider organizations. Important stakeholders including physician organizations, specialty societies, purchasers, regulators and consumers should be involved in such a consensus process.

Information and reporting needs

While there appears to be a growing consensus that information about the quality of care rendered by physicians or physician organizations should be made widely available, it is less clear what information should be a part of this performance measurement and reporting system. Various stakeholders may desire different types of information. For example, purchasers of ambulatory services who have to appropriately budget and plan for projected medical expenses (e.g. employers or MCOs) may require information about cost-effective care and over-utilization of unnecessary services. Consumers, on the other hand, may be most interested in the availability and convenience of services, courteous and respectful treatment from medical professionals, or the technical quality of services for serious health conditions (e.g. treatment for diabetes). At the same time, regulators and public health officials might desire information on access to health care services and the receipt of recommended but often underused services (e.g. preventive clinical services such as smoking cessation services or chlamydia screening). Physician organizations themselves might seek information on certain quality of care issues that are driven by the interests of their local marketplace(s) or the particular circumstances of their own organizations, professional associations and societies.

While one could speculate about stakeholder preferences for performance information for physician organizations, the true preferences of these groups should be documented through research. Stakeholders could be polled to identify a 'wish-list' from which information requirements could be identified. Such a list might furthermore rank performance information according to its strength of desirability and preference overlap. Just as it identified consumer preferences for health plan information, NCQA is currently working to establish empirically stakeholder information needs and preferences for information at the level of the physician organization and individual physician [20]. Other organizations are engaged in similar work, including several health care purchasing coalitions that are identifying their information needs and testing relevant sampling and data collection methods (e.g. patient surveys) in physician organizations in several markets [21].

In addition to establishing information requirements, optimal reporting formats for disseminating performance information must also be identified. Several report card formats for health plan information have been tested, providing preliminary information about potential arrays and maximum information complexity that can be processed by stakeholder groups such as consumers [22]. Because various stakeholders differ in their levels of interest and familiarity with health care information, reporting features may need to differ in detail and display. Also, depending on the purpose of the information (e.g. choosing a provider organization for receipt of services, quality oversight, contracting with a provider organization based on cost and quality concerns), different reporting mechanisms may be needed for the same data. These mechanisms might include interactive, computer-based decision support tools that allow users to establish their own preferences for weighting information and to identify provider organizations according to their own informational 'hierarchy of importance.' These tools have been well tested in some industries. However, their adoption in health care decision-making is still in its infancy [23].

Sustainable implementation

While detailed methods have been outlined for developing meaningful clinical performance measures at the health plan level [24] and a nationwide measurement system for health plans has been in place for nearly a decade, significant challenges in sustaining performance measurement efforts at the physician organization level remain.

As previously described, HEDIS® requirements detail sampling, data collection and reporting formats with the health plan serving as the unit of analysis. In order to report a variety of HEDIS® measures health plans must conduct a medical record review in contracted physician offices. As many physician organizations or clinics today contract with multiple MCOs, MCO efforts to collect information from medical records located in clinics are often uncoordinated and burdensome to physician organizations. Moreover, physician organizations typically do not receive feedback about their performance collected by MCOs for HEDIS® purposes.

Several projects are underway to identify approaches to remedy this situation. The underlying premise of these projects is to identify a sampling strategy that would identify statistically adequate sample sizes for the physician organization level. Additional analyses are to be performed to explore whether these samples could be segmented by payer, submitted to the appropriate MCO and then re-aggregated at the health plan level while maintaining patient confidentiality. If such methods could be identified and implemented, MCOs could meet their regulatory or accreditation requirements and physician organizations would receive important information about the quality of care rendered by their organizations based on sample sizes sufficiently large to allow for statistical inferences.

While this approach appears sensible, it also raises questions about how these efforts would be financed. Currently, MCOs bear the cost of performance measurement in order to satisfy regulators, accreditors or purchasers who may require performance measures as part of requests for proposals solicited from health plans. For health plans these activities

have become a part of doing business. Currently, physician organizations in many parts of the country, most prominently in California [25], are struggling financially and may find it very difficult to finance performance measurement activities. Furthermore, it is unclear who should provide funding for performance measurement efforts that could benefit multiple organizations and that overall might require larger sample sizes than are currently required to satisfy performance measurement efforts at the health plan level. Therefore, sustained performance measurement at the physician organization level will require creative financing solutions that are likely to involve remuneration by multiple stakeholders including MCOs, employers and potentially also state and federal government.

Conclusions

Implementing a widespread, useful performance measurement system for ambulatory care or physician organizations that satisfies a variety of stakeholders is an ambitious and important undertaking. While support for such a new measurement system is growing, substantial methodological, technical and financing challenges must be resolved before performance measurement of ambulatory care quality with physician organizations as the unit of analysis can become reality. The implementation of such a system appears timely since public disclosure of health care information is increasingly viewed as inevitable in societies with rising demands for accountability and information on all traded goods [11].

Limited data suggest that producing performance information has a significant impact on the internal improvement capabilities of the monitored health care organizations [11]. Although this conclusion has been reached based on experience with U.S. hospitals, it is conceivable that similar effects might be observed for physician organizations, since the leverage points for improved performance (i.e. directly and credibly influencing physician performance) may be similar in both physician organizations and hospitals. In addition, health plans or provider organizations that couple performance feedback for providers with the availability of quality improvement tools and assistance may be most successful in stimulating improvement [26].

Any new system must address the burden that performance measurement requirements at the health plan level have already created for physician organizations before additional requirements can be considered. At a minimum, performance measurement information collected about physician organizations should be meaningful to consumers and purchasers of care. In addition, the information should be useful to physician organizations for gauging their performance, implementing efforts that could effectively address any potential shortfalls and for remeasuring performance at a later point to detect improvements. Ideally, performance measurement targeting individual physicians seems most desirable. However, at the current time methodological challenges such as minimum sample sizes and confounding raise questions about the possibility of quickly implementing such a system [27,28]. For example, several potential performance measures (e.g. for chronic health conditions) could be problematic for small or even mid-size medical groups, let alone individual physicians, to implement due to small patient sample sizes. Thus performance measure aggregation across clinical conditions and certainly across health plans is likely to be required to establish meaningful quality information about small and mid-size provider organizations' performance.

A number of challenges currently prevent the adoption of a credible and sustainable performance measurement system that evaluates ambulatory care rendered in provider organizations. NCQA and other organizations are currently engaged in research projects to address the barriers discussed in this article. If successful, these efforts could allow consumers, purchasers and stakeholders to make value-based health care decisions and thereby create a more efficient and effective health care marketplace.

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References

1. Sultz HA, Young KM. Ambulatory Care. *Health Care USA: Understanding its Organization and Delivery.* Gaithersburg, MD: Aspen Publishers, 1997.

2. Starfield B. *Primary Care: Balancing Health Needs, Services and Technology.* New York: Oxford University Press, 1998.

3. Agency for Health Care Research and Quality. *Americans as Health Care Consumers: The Role of Quality Information.* Rockville, MD: AHRQ, 2000. http://www.ahrq.gov

4. Hibbard JH, Jewett JJ. What type of quality information do consumers want in a health care report card? *Med Care Res Rev* 1996; 53: 28–47.

5. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century.* Washington, DC: National Academy Press, 2001.

6. Administrators in Medicine. http://www.docboard.org. Note: website address at time of printing.

7. Mukamel DB, Mushlin AI. The impact of quality report cards on choice of physicians, hospitals and HMOs: a midcourse evaluation. *Jt Comm J Qual Improv* 2001; 27: 20–27.

8. Leatherman S, McCarthy D. Public disclosure of health care performance reports: experience, evidence and issues for policy. *Int J Qual Health Care* 1999; 11: 93–98.

9. Belman MJ, Payne-Simon L, Tom E, Rideout J. Using a quality scorecard to measure and improve medical groups' performance. *Jt Comm J Qual Improv* 1999; 25: 239–251.

10. McCormack LA, Garfinkel SA, Schnaier JA *et al.* Consumer information development and use. *Health Care Financ Rev* 1996; **18:** 15–30.

11. Marshall MN, Shekelle PG, Leatherman S, Brook RH. The public release of performance data: what do we expect to gain? A review of the evidence. *J Am Med Assoc* 2000; **283:** 1866–1874.

12. Roski J. Using measures for performance management. In *The Quality Advantage: A Strategic Guide for Health Care Leaders.* Chicago: AHA Press, 1999.

13. National Committee for Quality Assurance. *NCQA's State of Managed Care Quality Report.* Washington, DC: NCQA, 2000. http://www.ncqa.org

14. National Committee for Quality Assurance. http://www.ncqa.org. Note: website address at time of printing.

15. Solberg LI, Mosser G, McDonald S. The three faces of performance measurement: improvement, accountability and research. *Jt Comm J Qual Improv* 1997; **23:** 135–147.

16. Roski J, Morath J. Combining three measurement paradigms: a clinical health care performance measurement system. *J Strateg Perform Meas* 1999; **3:** 20–28.

17. Iglehart, JK. The National Committee for Quality Assurance. *N Engl J Med* 1996; **335:** 995–999.

18. Emanuel EJ, Emanuel LL. What is accountability in health care? *Ann Intern Med* 1996; **124:** 229–239.

19. Gosden T, Forland F, Kristiansen IS *et al.* Impact of payment method on behaviour of primary care physicians: a systematic review. *J Health Serv Res Policy* 2001; **6:** 44–55.

20. National Committee for Quality Assurance. *Developing Patient-Centered Measures of Physician Quality.* Washington, DC: NCQA, 2000. http://www.ncqa.org

21. Damberg C. Physician group-level performance measurement: design and implementation challenges in moving toward standardized performance metrics. *18th Annual Conference of the Association of Health Services Research.* Atlanta, GA, 10–12 June, 2001.

22. Hibbard JH. Use of outcome data by purchasers and consumers: new strategies and new dilemmas. *Int J Qual Health Care* 1998; **10:** 503–508.

23. Wong HJ, Legnini MW, Whitmore HH. The diffusion of decision support systems in health care: are we there yet? *J Healthcare Manage* 2000; **45:** 240–249.

24. McGlynn EA, Asch SM. Developing a clinical performance measure. *Am J Prev Med* 1998; **14:** 14–21.

25. Dalzell MD. California physicians struggling–problems ahead for other states? *Manage Care Q* 1999; **8:** 45–48.

26. Simon LP, Belman MJ, Tom E, Rideout, J. Provider group characteristics & quality report card performance: a cross-sectional study in a managed care setting. *Am J Med Qual* 1999; **14:** 138–145.

27. Hofer TP, Hayward RA, Greenfield S *et al.* The unreliability of individual physician report cards' for assessing the costs and quality of care of a chronic disease. *J Am Med Assoc* 1999; **281:** 2098–2105.

28. Kaplan S, Greenfield S. To profile or not to profile? Methodological issues in assessing quality of care at the physician level. *18th Annual Conference of the Association of Health Services Research.* Atlanta, GA, 10–12 June, 2001.

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